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Two new species of pseudoscorpions (Arachnida, Pseudoscorpiones) from caves on Tenerife and La Palma (Canary Islands, Spain), with some new records from the Canary Islands and the Azores (Portugal)

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Two new species of pseudoscorpions (Arachnida, Pseudoscorpiones) from caves on Tenerife and La Palma (Canary Islands, Spain), with some new records from the Canary Islands and the Azores (Portugal). - The new species *Paraliochthonius mirus* sp. n. (La Palma, Cueva de los Sorprendidos) and *Calocheirus tenerifae* sp. n. (Tenerife, Cueva Hondo de Güimar) are described and figured. New localities are given for species of several families. The genus *Cheiridium* (Cheiridiidae) is recorded for the first time from the archipelago. Identifications keys are proposed for the Canarian species of the genera *Paraliochthonius*, *Tyrannochthonius* and *Lagynochthonius* and for all species of the genus *Calocheirus*. *Pseudoblothrus vulcanus* is recorded from several caves of Terceira and from the Island of Pico (Azores).

Key-words: Canary Islands - Azores - biospeleology - Pseudoscorpiones - new species.

INTRODUCTION

Intensive efforts in surveying the biodiversity of the Canary Islands have already yielded remarkable results (Izquierdo *et al.*, 2001). Knowledge of the pseudoscorpion fauna of the archipelago has been summarized by Mahnert (1997) and Mahnert & Oromí (2001). In the meantime, Dr Pedro Oromí (Departamento de Zoologia, University of La Laguna, Tenerife: DZUL) sent me some more pseudoscorpions collected during his biospeleological and biological surveys on different islands. The Museum of Natural Sciences of Madrid has carried out a study on the National Park "Caldera de Taburiente" and the pseudoscorpions were sent to me by Mr Rafael García Becerra (La Palma). My colleague Dr Charles Lienhard (Muséum d'histoire naturelle, Geneva: MHNG) collected some epigean pseudoscorpions during his visit to Gran Canaria in 1999. Besides new localities for some species and a first record of the genus *Cheiridium*, two new species are described here. As a result, the pseudoscorpion fauna of the Canary Islands now comprises 48 species/ subspecies. *Pseudo-*

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blothrus vulcanus Mahnert has been collected from several caves by Dr Paulo Borges (Universidade dos Açores, Terceira) during his biospeleological survey on the Azores Islands.

RESULTS

NEW RECORDS

Note: Material without indication of collectors' names has been collected by Dr Pedro Oromí and his collaborators.

Canary Islands

Chthonius (Ephippiochthonius) gracilimanus Mahnert, 1997

Material: La Palma: Cueva Llano de los Caños, 25.11.2000 (MHNG); Cueva de los Palmeros, 9.12.2000 (DZUL).

Tyrannochthonius setiger Mahnert, 1997

Material: Tenerife: Sima de la Perdiz, 28.6.1999 (DZUL, MHNG), Cueva del Bucio, 18.6. 1999 (MHNG), Cueva del Mulo, 2.6.1998 (MHNG), Cueva de la Chatarra, 23.10.1991 (MHNG).

Tyrannochthonius superstes Mahnert, 1986

Material: Tenerife: Cueva de Breveritas, 10.7.1999, 18.12.1999, 17.3.2000 (DZUL, MHNG), Cueva de Belés, 19.11.1999 (MHNG)

Paraliochthonius martini Mahnert, 1989

Material: El Hierro: Cueva de los Pocitos, 8.10.2000 (DZUL, MHNG).

Microcreagrina subterranea Mahnert, 1993

Material: Tenerife: Cueva Hondo de Güimar, 26.10.1999 (MHNG), Cueva del Bucio, 21.10.1999 (MHNG).

Calocheirus canariensis (Beier, 1970)

Material: Gran Canaria, Cuesta de Silva, E of Guía, 230m, under stones, 26.2.1999, lg. Ch. Lienhard (MHNG).

Geogarypus minor (L. Koch, 1873)

Material: Tenerife, Teno Alto, 950m, 17.1. 1982, lg. A. Machado (MHNG).

Cheiridium sp.

Material: Gran Canaria: Barranco de Mogán, near Las Casillas, 200m, under bark of *Pinus canariensis*. 2.3.1999, lg. Ch. Lienhard: 2 tritonymphs (MHNG).

Remark: The genus is new for the archipelago, identification to species level of the tritonymphs is not possible.

Pselaphochernes lacertosus (L. Koch, 1873)

Material: Lanzarote, dunas de Orzola, 12.2.1993 (MHNG).

Canarichelifer teneriffae Beier, 1965

Material: Alegranza: Marpaís, 6.5.1993 (MHNG).

Rhacochelifer gracilimanus Mahnert, 1993

Material: Hierro, Hoya del Morcillo, 4.2.1992 (MHNG).

Azores

Pseudoblothrus vulcanus Mahnert, 1990

Material: Island of Terceira: Gruta da Malha, Gruta Principantes; Island of Pico: Gruta da Baliza, Furna Nova; lg. Paulo Borges.

Remark: The species has been decribed from Gruta da Beira (Terceira) (Mahnert, 1990).

DESCRIPTION OF THE NEW SPECIES

Paraliochthonius mirus sp. n. Figs 1-4

Material: Canary Islands, La Palma, Cueva de los Sorprendidos (El Paso), 19.7.2000, lg. Rafael García Becerra: 1♂ (holotype) (Mus. Madrid), 1♂ (paratype) (MHNG).

Etymology: Latin adjective *mirus*: amazing.

Description: Carapace and pedipalps yellowish-brown, chelicerae brown; tergites whitish-yellow; sternites III and IV laterally slightly darker, otherwise whitish-yellow. Carapace 1.1 longer longer than broad, four eyespots present, the posterior ones indistinct and small; epistome slender and prominent; 16 macrosetae (4:4:4:2:2) plus one preocular microseta on each side. Tergal setae: (3-)4:4:4:6:6:6:6-7:6-7:7:4:6 (2 submedian tactile setae). Manducatory process with 2 setae, coxal setae: pedipalpal coxa 3, I 3, II 7-8 serrated coxal spines (in one row)(as figured for *P. martini* in Mahnert, 1989, fig.9), III 4-5, IV 5; intercoxal tubercle absent. Genital operculum 10-11 setae, sternal setae: 6 (+ 3-4 microsetae on each stigma):6 (+ 2x3):10:9:9:9:9:7-9 (2 tactile setae):0. Cheliceral palm with 5 setae (Fig. 1), fixed finger with 7-9 (distal ones enlarged) and movable finger with about 5-6 rounded and nearly rudimentary teeth; spinneret absent; serrula interior with 15, s. exterior with 24-25 blades; flagellum 7 setae.

Pedipalps (Figs 2-3): Hand with 3 internal spine-like setae; fixed finger with 43-47, movable finger with 45-46 triangular teeth of nearly equal length, base of movable finger not modified; a small sensillum near *sb* ; trichobothria see Fig. 4, *sb* clearly nearer to *st* than to *b*; femur 6.5-6.7 times longer than broad and 2.22-2.27 times longer than patella, patella 2.4-2.6 times, hand 2.1-2.2 times, chela 6.8-6.9 times longer than broad, fixed finger 2.2-2.3 times longer than hand; movable finger slightly shorter than fixed one.

Leg I: Femur 7.1-7.2 times longer than deep and 1.9-2.1 times longer than patella, patella 3.7-4.3 times, tibia 5.3-5.9 times, tarsus 11.5-12.5 times longer than deep. Leg IV: Femur+patella 4.0-4.1 times, tibia 7.0-7.2 times, basitarsus 3.5-3.6 times, telotarsus 14.0-15.6 times longer than deep and 2.7-2.8 times longer than basitarsus, both with a tactile seta (near base or proximal of middle).

Measurements (in mm): Carapace 0.71-0.73/0.67-0.70; Pedipalps: femur 1.21-1.25/0.19, patella 0.53-0.57/0.20-0.24, hand 0.62-0.63/0.29-0.30, fixed finger length 1.39-1.43, chela length 1.96-2.05. Leg I: femur 0.74/0.10, patella 0.35-0.38/0.09-0.10, tibia 0.41-0.44/0.06-0.07, tarsus 0.77-0.82/0.07. Leg IV: femur+patella 1.08-1.13/0.27, tibia 0.79-0.84/0.11-0.12, basitarsus 0.33-0.35/0.10, telotarsus 0.90-0.97/0.06.

Discussion: Cave-dwelling species of the genus *Paraliochthonius* are already recorded from El Hierro (*martini* Mahnert) and from Tenerife (*tenebrarum* Mahnert). The new species from La Palma is clearly related to *martini* and shares with this species the presence of three spine-like setae on the internal face of the chelal hand, triangular distal teeth on the movable chelal finger and the presence of eyespots. It differs from *martini* by bigger size, by having a relatively shorter fixed finger (2.2-2.3 *vs* 2.6 times longer than hand) and by the presence of (very indistinct) posterior eyespots.

Relationships between the genera *Tyrannochthonius* and *Paraliochthonius* from Canary Islands with *Stygiochthonius* (Carabajal Márquez *et al.*, 2001), recently described from continental Spain (Almería), are not yet well defined. This genus from Almería shares with *Paraliochthonius* some characters, e.g. the presence of two or three spine-like setae on the internal face of the chelal hand and of the saw-like (alternatively inclined) teeth on chelal fingers, but the latter can also be observed in *Tyrannochthonius superstes*. The high number of coxal spines (12-14) may have to be reconsidered as a specific character, since the number of coxal spines ranges from 6-10 in the Canarian species of *Tyrannochthonius* and *Paraliochthonius*.

Some of the characters emphasized by Muchmore (1984) as distinctive for *Tyrannochthonius* might be found, in the concerned area, in *Paraliochtonius* species and vice versa (e.g. position of trichobothrium *sb*), some others (e.g. heterodentate chelal fingers, epistome closely flanked by the 2 central carapacial setae) do not occur in any of the Canarian species assigned actually to *Tyrannochthonius*. It might therefore be necessary to reconsider the generic status of all species from this region actually placed in the genera *Paraliochthonius*, *Tyrannochthonius*, *Stygiochthonius* and even *Lagynochthonius*.

Identification key to the species of the genera *Lagynochthonius*, *Tyrannochthonius* and *Paraliochthonius* from the Canary Islands

1 Chelal hand with two or three strong, spiniform internal setae 4
1* Chela hand without or with only one slightly stronger seta 2
2 Base of movable chelal finger with strongly sclerotized apodeme; both fingers strongly curved in distal half . . *Lagynochthonius curvidigitatus* Mahnert
2* Base of movable chelal finger without strongly sclerotized apodeme, fingers straight 3
3 Pedipalps slender, chelal hand at least 2.8 times longer than broad, chela at least 10.3 times longer than broad, 5 setae on cheliceral palm . . . . *Tyrannochthonius superstes* Mahnert
3* Pedipalps stouter, chelal hand 2.0-2.2 times longer than broad, chela 7.0-7.7 times longer than broad, 6-7 setae on cheliceral palm . . . . *Tyrannochthonius setiger* Mahnert

4 Chela hand with two spiniform setae 5
4* Chelal hand with three spiniform setae 6
5 Four eyes with lenses present; smaller species (length of palpal femur 0.65 mm); living in upper littoral zone . . *Paraliochthonius canariensis* Vachon
5* Eyes or eyespots absent; larger species (length of palpal femur 0.86 - 1.04 mm); living in caves . . . . *Paraliochthonius tenebrarum* Mahnert
6 Smaller species, length of palpal femur 0.94mm, length of chela 1.45 mm . . . . *Paraliochthonius martini* Mahnert
6* Larger species, length of palpal femur 1.21mm, length of chela 1.96 mm . . . . *Paraliochthonius mirus* sp. n.

Calocheirus tenerifae sp. n. Figs 5-7

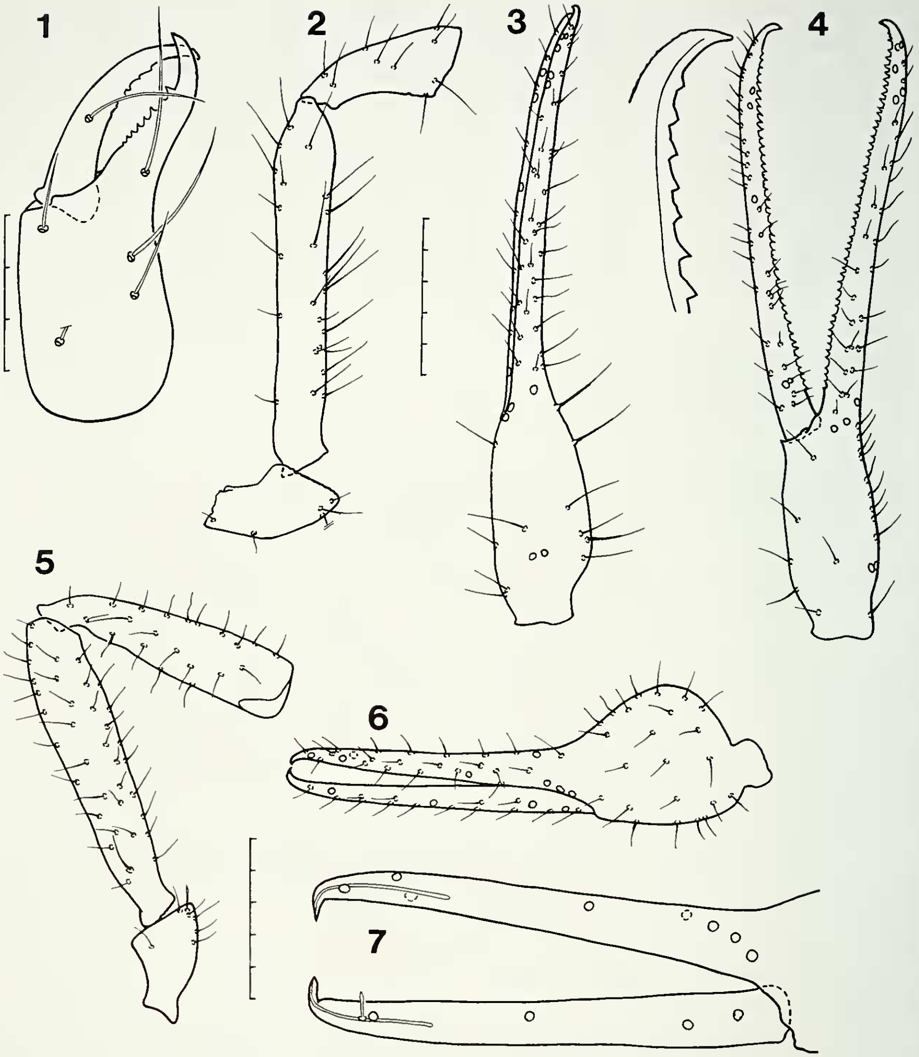
Material: Canary Islands, Tenerife, Cueva Hondo de Güimar, lg. M. Arechavaleta, 13.IV.1999: 1 ♀ (holotype) (DZUL).

Description: Pedipalps yellowish-brown, carapace olivaceous, tergites and sternites indistinctly olivaceous. Carapace 1.6 times longer than broad, smooth, with a very weak sub-basal transverse impression; cucullus relatively long; four large eyes present; 25 setae in total, of which 6 are at anterior and 5 at posterior margin; tergites undivided, chaetotaxy: I-II 4, III-VIII 6, IX 8 (2 sublateral tactile setae), X 6 (2 tactile setae), XI 8 (2 tactile setae). Manducatory process with 3 marginal and 2 discal bristles; coxae of pedipalps smooth, with 13 bristles, coxae I 7, II 9, III 10, IV 16 bristles; genital operculum with 5 central setae; sternites usually with 6 marginal setae, no suprastigmal microchaetae. Chelicera: 5 setae on palm, fixed finger with 5 basally-directed teeth, movable finger with broad tooth-like subapical lobe, galea with three apical branchlets, serrula exterior of 18 lamellae, flagellum with one large anterior and a small posterior blade.

Pedipalp (Figs 5,6): Femur smooth, with a tactile seta near base, 4.9 times longer than broad, patella 4.1 times, club 3.4 times, hand with pedicel 1.3 times longer than broad, strongly bulged medially, chela with pedicel 3.4 times longer than broad, finger 1.7 times longer than hand; fixed finger with 40 pointed teeth, movable finger with 11 pointed distal teeth and 14 large, flattened and indistinct ones, a lanceolate seta near trichobothrium *t* (Fig. 7).

Leg I: femur 5.0 times longer than deep and 2.2 times longer than patella, patella 2.4 times longer than deep, tibia 6.8 times, basitarsus 5.3 times longer than deep and 1.3 times longer than telotarsus, telotarsus 6.2 times longer than deep. Leg IV: femur+patella 2.8 times, tibia 5.7 times, basitarsus 4.8 times longer then deep and 1.3 times longer than telotarsus, telotarsus 5.3 times longer than deep; chaetotaxy of basitarsus: tactile seta + 2/3/4; arolia undivided, clearly longer than the smooth and large claws.

Measurements (in mm): Carapace 0.84/0.54. Pedipalps: Femur 1.04/0.21, patella 0.84/0.21, hand with pedicel 0.56/0.42, length of fixed finger 0.95, length of chela with pedicel 1.45. Leg I: Femur 0.49/0.10, patella 0.23/0.09, tibia 0.41/0.06, basitarsus 0.26/0.05, telotarsus 0.20/0.03; leg IV: Femur+patella 0.80/0.29, tibia 0.61/0.11, basitarsus 0.33/0.07, telotarsus 0.25/0.05.



FIGS 1 – 7

FIGS 1- 4: *Paraliochthonius mirus* sp. n.; 1: chelicera of paratype; 2-3: pedipalp of holotype (2: proximal articles, 3: chela); 4: palpal chela in lateral view, distal teeth of movable finger enlarged. FIGS 5-7: *Calocheirus tenerifae* sp. n.; 5-6 pedipalp (5: proximal articles, 6: chela), 7: trichobothrial pattern. Scale unit 0.1mm.

Discussion: Three species of the genus *Calocheirus* have already been described from the Canary Islands. The new species *tenerifae* sp. n. shares with *gigas* (Mahnert) the big size and slender pedipalps, but is somewhat smaller and its pedipalps are somewhat stouter. It is unlikely to be restricted to caves.

Key to the species of the genus *Calocheirus* Chamberlin

1 Small-sized species, length of palpal femur not exceeding 0.81 mm 2

1* Large species, palpal femur 1.24 mm long and 5.6 times longer than broad, chela 4.3 times longer than broad (length 1.86 mm). - Gran Canaria . . . . *Calocheirus gigas* (Mahnert)

1** Medium-sized species, palpal femur 1.04mm long and 4.9 times longer than broad, chela 3.4 times longer than broad (length 1.45 mm). - Tenerife . . . . *Calocheirus tenerifae* n. sp.

2 Tergites I-VIII with 4 setae, palpal femur 4.0 times longer than broad (length 0.66 mm), chela 3.5 times longer than broad, length 1.12 mm; fixed finger with 28 teeth, movable one with 24 teeth. - Sudan . . . . *Calocheirus atopos* Chamberlin

2* Only the first two or four tergites with 2 - 4 setae 3

3 Anterior tergites with 4 setae 4

3* Tergites I and II with 2 setae, palpal femur 4.6-5.0 times longer than broad (length 0.71-0.81 mm), chela 3.5-3.9 times longer than broad (length 1.16-1.39 mm), fixed finger with 37-40 teeth, movable one with 25-31 teeth. - Saudi Arabia . . . . *Calocheirus gracilis* Mahnert

4 Usually only tergites I and II with 4 setae; palpal femur 3.7 times (female) - 4.7 times (male) longer than broad (length 0.69-0.81 mm), chela 2.5 times (female) - 3.4 times (male) longer than broad, length 1.08 (male) - 1.43 (female). - Gomera . . . . *Calocheirus mirus* Mahnert

4* Tergites I-IV with 4 setae; palpal femur 3.7 - 4.1 times longer than broad, (length 0.41-0.55 mm), chela 3.1 (female) - 3.7 times (male) longer than broad (length 0.72-0.84 mm). - Canary Islands . . . . *Calocheirus canariensis* (Beier)

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